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EFFICIENCY IN THE PUBLIC-HEALTH CAMPAIGN

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THE science of public health had its beginnings in the discovery of the causes and vehicles of disease, twenty years ago. To-day we are entering upon a second epoch in the history of the war against the microbe. There is a change coming over the spirit of sanitary science almost as important as that which occurred between 1880 and 1900. The period of Pasteur and Koch marked a transition from intuitive guesswork to science; and to-day we are making a further step, from a merely scientific and rational, to an economic and quantitative viewpoint. We ask now, not as we did ten years ago, "Is such-and-such a thing dangerous?" but, "How dangerous is it?" Cities are cramped for funds and there is no prospect that for some time to come half as much money will be available for health purposes as could profitably be spent. It is impossible to attack all the points at which microbic foes or unhealthful conditions might possibly injure an occasional victim. Resources must be directed with skilled generalship against those gaps in our defenses where the enemy is constantly striking down his victims in large numbers. There are such gaps, numerous and important enough to demand the best energies of the competent public-health expert. He is striving therefore to cut down expenditures for some of the ancient and traditional, but fruitless, health activities and to apply the money where it will do most good. He is asking himself continually, "How can I save the greatest number of lives for a hundred or a thousand dollars by this or that line of preventive work?"

The first fruits of this economic point of view is the relegation to a position of obscurity of some of the most time-

honored activities of the municipal health department. Perhaps even to-day the average citizen may believe that the chief functions of the Board of Health are to keep the neighbor's back yard clean, to inspect plumbing, and to disinfect after contagious disease; yet all these duties are of minor if not of negligible importance. The dread of disease from garbage in the back lot is a legacy from Murchison's pythogenic theory. We know to-day that the only important relation of garbage to disease lies in the fact that it may, under certain circumstances, breed flies which may, in turn, serve as carriers of pathogenic germs. Municipal cleanliness is good for its own sake and only in a minor degree as a health measure, except in warm climates where insect-borne disease is an important factor; and garbage collection and disposal is more and more generally transferred from the health department to some other division of the city government. From the pythogenic theory, too, dates the fear that miasms of disease may emanate from a pinhole in the plumbing pipe and fly across the room to seize upon their helpless victims. There are, no doubt, disease germs in sewage, but they cannot be detached from moist surfaces except by considerable force, and bacteriological studies have shown that if a man placed his mouth at the top of a house drain and breathed drain or sewer air for twenty-four hours continuously he would run less danger of acquiring intestinal germs than in drinking a quart of New York water prior to the installation of a disinfection plant in 1911. So plumbing inspection, in progressive cities, is taken from the health board and placed with the building department where it properly belongs.

Even the problem of sewage disposal is changing its aspect under the influence of the same considerations. The demand for complete and ideal purification in all instances is giving way to the rational consideration of each special case on its own merits, carrying the treatment just so far as is necessary for local needs. As Professor Whipple has so effectively pointed out it is not Sewage Purification, but Sewage Treatment that is desired and treatment carried, only so far as is really essential, in view of the pressing demand for other applications of public-health funds.

These alterations of emphasis have come from a recognition of the fact that communicable disease does not arise from decomposing organic matter, but from infected per-

sons. The demonstration, abundantly established by bacteriological and epidemiological evidence, that, even material, which has been infected, rapidly loses its infectivity, that disease germs, habituated to the warm rich fluids of the body, quickly die out when removed from it, that recent infection is the dangerous infection,—this demonstration too has an important influence upon practical sanitation. Air-borne disease has been shown to be a negligible factor except in the immediate neighborhood of the infected person, where coughing or loud speaking may throw out a fine spray of germ-bearing droplets. Even fomites, or objects which have been in contact with the sick, are dangerous only when infection has been recent. The tales of toys put away in a closet for two years and yet capable of transmitting disease are purely mythical.

From the fact that microbes are carried only in gross particles of excretal material there has arisen a new conception of disinfection. The disinfection of excreta, of sputum and bowel discharges, and of bedding and clothing, and other things which have been in direct contact with the sick, assumes greater and greater importance. On the other hand, general room-disinfection, the burning of sulphur or formaldehyde to destroy germs floating in the air or perching on the walls or ceiling is coming more and more to be regarded, as a sanitary authority has expressed it, as “incense burned to the memory of bygone theories of disease.” Even when gaseous disinfection is to follow, sterilizing of clothing and bedding by heat and thorough cleansing of infected surfaces is essential, since formaldehyde gas has little penetrative power; and, if these things are done, gaseous disinfection is of no particular importance as shown by the experience of cities where it has been abandoned.

Only one other instance need be cited of the negative or critical side of the new attitude toward prophylactic measures. This concerns the campaign for pure foods which, though essentially important, and the result of modern science rather than a heritage from pythogenic days, has been carried to such extremes by many of its leaders that it threatens to do serious harm by obscuring the proper sense of proportion for which we are striving. Infected water, milk, and raw shellfish are real dangers, of great practical importance, and measures for their control have produced definite and tangible results. With the exception of these

three substances, however, the danger to life and health from "impure foods" is not quantitatively an important one. Food-poisoning due to decomposed foods undoubtedly occurs and should be prevented, so far as possible, by the exclusion of meat and fish obviously tainted. Unfortunately, however, we have in most cases no tests for the detection of incipient decomposition which are as yet sufficiently well established to supplement the evidence of the senses. The large sums of money spent by municipal health departments in the condemnation of decayed fruit have absolutely no warrant from a public-health standpoint. Even the sale of meat from diseased animals is not an appreciable cause of human disease, thanks to the saving grace of cookery. As a matter of fact most cases of food-poisoning are due to decompositions in salads and the like after the food has been cooked and can be prevented only by care in the kitchen. A prominent pathologist recently deplored the fact that tons of tuberculous meat are sold in New York. It would be a sad day for New York if such were not the case, for New York would go hungry if all tuberculous meat were excluded from the market. The ideally healthy animal is about as rare as the ideally perfect human being, and the present policy of condemning only grossly diseased animals, and parts of animals, errs if anything on the side of severity. As Dr. Theobald Smith has pointed out the pressure of the cost of living is likely to bring us nearer to the German system under which much meat condemned here would be utilized for food after sterilization. We need, not less inspection, but more; only the ultimate disposal of the inspected goods should be governed by the principle that all foods which can be safely used should be used and not wasted for sentimental reasons. These problems have two sides; and it is the condemnation, not the utilization, of safe but second-grade foodstuffs which should be considered an injury to the public.

Adulteration and misbranding is for the most part an economic, rather than a sanitary, problem. There are exceptions to this rule, as in the case of the use of arsenic for coloring candies and notably in the case of poisonous and habit-forming drugs, the sale of which is of serious moment. For the most part, however, adulterants are no more unwholesome than the things for which they are substituted. They injure the pocketbook and so indirectly the health, but

their control is not primarily a health measure. So with the question of preservatives. Some preservatives, like sugar, salt, vinegar, cloves, cinnamon, mustard, are commonly used in the household and little objection has been raised to them. Other preservatives, like benzoic acid and benzoates, salicylic acid and copper sulphate, are less familiar and the whole country has been ringing with the agitation over them. It is unnecessary here to go into the detailed merits of this controversy, although in the opinion of the writer the truth seems to lie, as pointed out by Dr. D. R. Lucas, somewhere between the extreme positions of the Bureau of Chemistry on the one hand and the Referee Board on the other. The main point for our present purpose is, that the harmfulness of benzoate of soda is at least so slight that it cannot be demonstrated to exist at all to the satisfaction of some of the ablest and most disinterested chemists and physiologists. Such being the case, it is obvious that, from the quantitative viewpoint, this dubious danger should not be allowed to divert attention from causes of disease and death which we know kill their thousands and their tens of thousands.

I do not in any way question the general righteousness of the Pure Food law and the campaign of which it forms a part. Dr. Wiley and his associates have made a good fight for honesty and cleanliness, a fight which should be continued, though now on more rational and less emotional lines. It is time, however, that a movement which is primarily economic and esthetic should cease to monopolize attention as a supreme factor in the public-health movement, which it is not; and it is time that some of the energies which have been turned in this direction in the name of Hygeia should be diverted to more profitable channels. If the Women's Clubs of this country could be as actively interested in infant mortality and tuberculosis as they have been in pure foods, we should see something approaching a sanitary revolution.

The only safe way to guide public-health efforts along quantitative lines is to govern them by an intelligent study of vital statistics. Vital statistics are, to public health, what bookkeeping is to the ordinary business. The wise merchant studies his records of profit and loss and expands along the lines where he can get the best interest on his capital. So with the modern health officer. The various

causes of death in his city indicate the possible end toward which he may direct his efforts, and his past experience and the experience of others tells him which of them are likely to be profitably attacked. For example, there were 732,538 deaths in the registration area of the United States in 1909. One hundred and seventy-four thousand four hundred and seventy of these deaths were from various minor causes hard to classify in brief form. The other 558,068 deaths, or 76 per cent. of the whole, were due to 11 causes which may be grouped in two series as below.

A.—IMPORTANT CAUSES OF DEATH WHICH ARE IN THE MAIN OF
EXTERNAL ORIGIN AND THEREFORE PREVENTABLE

Typhoid fever	10,722
Diphtheria	10,358
Other epidemic diseases	28,908
Tuberculosis	81,720
Pneumonia and other respiratory diseases	90,868
Diarrhœa of infants	44,648
Accidents	47,135
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Total	314,359

B.—IMPORTANT CAUSES OF DEATH WHICH ARE IN THE MAIN OF
INTERNAL ORIGIN AND NOT AT PRESENT PREVENTABLE

Cancer and tumors	38,020
Nervous diseases	66,803
Circulatory diseases	90,456
Bright's disease	48,430
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Total	243,709

This classification is of course an imperfect one. Tuberculosis is in large measure the result of hereditary predisposition, which is an internal factor; and a man may die of heart disease as a result of lifting heavy weights, an external factor. In the main, however, it is true that there is one great class of important diseases, like cancer and the others in its class, which are not at present within the practical control of public-health authorities. It is to the other class of diseases, in which external and controllable factors are predominant, that the health officer must turn, in order to use his funds to best advantage; and it is encouraging to note that the seven controllable causes of death enumerated above include 314,359 deaths in the registration area, or 43 per cent. of the total.

No one can safely predict the entire elimination of all, or any, of these "preventable" causes of death. What is certain is that they could be greatly reduced by the application of simple, known measures of control. It would be very conservative to assume that tuberculosis and the respiratory diseases could be diminished by one-quarter and that the other death rolls could be cut in half, within the immediate future, meaning a saving of 100,000 lives a year.

Typhoid fever (10,000 deaths in the registration area) can be reduced by purification of water and pasteurization of milk, by anti-fly campaigns in the South, by excluding polluted shellfish from the market, by the bedside disinfection of excreta, by the supervision of carriers, by general education in habits of personal cleanliness, and by vaccination of those likely to be exposed to infection. In Pittsburg the filtration of the public water supplies cut the typhoid death-rate down to an extent which meant a saving of 400 lives a year. In Chicago and Boston the general pasteurization of milk supplies was followed by a reduction in the typhoid rate amounting to a saving of 100 and 30 lives a year, respectively. At Jacksonville, Florida, as in many Southern cities, the fly is an important agent in transmitting typhoid fever; and here a vigorous campaign for the elimination of flies and the screening of vaults led to a saving of 22 lives a year in a population of only 60,000. Remember that these reductions are not transient, but permanent, and consider what the saving of 20 or 100 lives a year in one city really means in lifting the burden of sorrow and suffering from the human race.

In addition to these sanitary measures of control, we now have in the case of typhoid fever a thoroughly efficient protective vaccine. Better sanitation had something to do with the protection of our army camps in Texas from typhoid fever, but the main influence was vaccination, which was so efficient that out of 12,800 men at San Antonio in an unsanitary typhoid-infected country there was but one case of typhoid, a teamster who had not received his second inoculation. In a similar body of men in the Spanish War there would have been 2,000 cases of typhoid and 200 deaths.

Diphtheria (10,000 deaths a year in the registration area) is the second great controllable cause of death. It can be held in check by two principal measures, by the detection and

isolation of suspected persons and by curative and protective injections of antitoxin. In diphtheria and typhoid fever and certain other diseases it is possible to detect the carriers by bacteriological examinations and by this means important results have been achieved. By effective school inspection, diphtheria can be reduced to a low level, and the examination of the throats of persons exposed to the disease, with prompt isolation and antitoxin treatment of those who prove to be infected, has again and again proved efficacious in quickly putting a stop to a threatened epidemic. The most effective of all our weapons against this disease is of course antitoxin. It came into general use in this country between 1894 and 1896, and while the death-rate in New York and Chicago for the decade 1885-1894 was over 140 per 100,000 it dropped to less than 70 for the decade 1895-1904. This meant an annual saving of over 2,500 lives a year in New York City alone.

The other contagious diseases (30,000 deaths a year in the registration area) which include measles, scarlet fever, whooping-cough, and the like, are much less easily controllable, since we have no specific vaccines against them and, in many cases, lack the clear knowledge as to their mode of spread which is necessary to the most efficient sanitary control. The isolation of the infected individual has shown itself most useful with rarer diseases like cholera and plague which can be kept out entirely from countries in which they have not gained a foothold. During the past two summers the bacteriological examination of passengers from cholera ports and the isolation of infected persons has proved an impassable barrier at our maritime cities. We have had in history two great world pandemics of bubonic plague beginning in the sixth and eleventh centuries; and we should to-day be in the midst of a third, of similar character, if it were not for the protections of modern sanitary science. The present outbreak began as the earlier ones did in Asia in 1894 and ravaged unhappy India, killing 8,000,000 persons. It has found its way all over the world, to Cuba and Porto Rica and South America. The rats in England have become infected and the ground squirrels in California. Everywhere, however, outside of Asia, the disease has been met by restrictive measures. Human cases and infected rodents have been discovered and it has been demonstrated that even the terrible "Black Death" is under our control.

With the more familiar diseases which have gained a foothold and are widely distributed in the community isolation is much more difficult on account of the presence of unrecognized and carrier cases. In many instances, as in measles, the very early stages are the most infective ones, while in other diseases, as in typhoid fever, the recovered convalescent may in rarer cases continue to distribute virulent germs for twenty years. A certain proportion of normal persons may be carriers of infectious germs without ever having had the particular disease. Some 2 or 3 per cent. of any average population will be diphtheria carriers and 2 or 3 out of a thousand will be typhoid carriers. This is the great reason why it is so hard to secure good results from isolation in many diseases, particularly those in which the specific germ remains unknown. Measles, whooping-cough, and scarlet fever have been reduced, and will be further reduced, by isolation regulations, but a still more powerful factor is the spread of popular education as to bacteriological cleanness in daily life, a cultivation of what may be called the aseptic sense, the subconscious instinct which keeps the hands so far as possible from what has been specifically infected by the hands or mouth of the sick and which guards the mouth with certainty against whatever has not been specifically cleaned.

The largest of all groups of preventable disease, the shining targets for the sanitarian, are the respiratory diseases, tuberculosis, pneumonia, and bronchitis. We can make headway against tuberculosis (80,000 deaths) by pasteurization of milk to eliminate bovine infection, by enforcing the proper care of sputum, and, above all, by attention to the factors which effect vital resistance, by better housing, by improvements in factory ventilation, and the elimination of dangerous dusts which lacerate the lung tissue of grinders, granite-workers, and the like and by popular education in the rules of hygienic living. The latter factors, housing and working conditions, fresh cool air, and the personal conduct of life, are also the prime measures in the control of pneumonia and bronchitis (90,000 deaths).

The fight is by no means an easy one. Hopes entertained fifteen years ago that tuberculosis sanatoria would soon be curiosities like the pest-houses of the Middle Ages have been rudely shattered. Yet we are making headway. In New York State the death-rate for 1911 was 150 per 100,000

against an average death-rate of 180 for the past twenty-five years. This means a saving of 2,800 lives a year, by comparison merely with the average, and not with the extreme conditions of twenty years ago. This result has been achieved mainly by sanatorium treatment and by a campaign of popular education in the principles which should underlie the conduct of the individual life. We know from the results of the bacteriologists that practically all adults are infected with the tubercle bacillus and, from the statistical studies of Karl Pearson, that in adult life the element of infection plays an almost negligible part. Tuberculosis is a disease of the factory and the tenement. In certain dusty trades four out of five deaths are from "grinder's consumption" or its analogue. We have made much progress in the cure of the great white plague and a beginning in its prevention; but rapid progress will come only, I believe, through a definite movement for the sanitation of living and work places and for the hygienic conduct of the individual life, such as has yet hardly been attempted.

Infant mortality, and particularly infant diarrhœa (45,000 deaths a year in the registration area), is the second great strategic point of attack for the progressive sanitarian. Here the really effective weapon is again education,—education of the individual mother. Breast-feeding, first and foremost, and intelligent personal care in clothing, bathing, airing, and the like could unquestionably prevent one-half of the slaughter of the innocents which carries off one baby out of five born in many of our cities before it reaches the age of one year. The work of the municipal health department and the New York Milk Committee in New York City has furnished a brilliant example of what may be accomplished. Vigorous efforts to reach the mothers began on a large scale in the spring of 1911. The reduction in death rate that followed is equivalent to a saving of 1,182 lives a year, and in the summer of 1912 the death-rate fell still further below that of 1911.

Finally, accidents (47,000 deaths a year in the registration area) could be greatly reduced, as they have been reduced in European countries, by regulation of railroading, mining and factory work, and by the extension of systems of workmen's compensation, which automatically prevent many preventable accidents, while they place the burden for the non-preventable accidents where it belongs. It is well to remem-

ber that the fatality among the employees of English railways is one-fourth what it is here and the rate of non-fatal accidents only one-seventh of ours. In coal-mining, Belgium had a fatality in 1830 about the same as that which exists in American mines to-day; but the Belgian death-rate has been cut to less than one-third of what it was.

One interesting and notable thing about modern public-health work is its tendency to supplement purely administrative methods by educational ones. First, in connection with the anti-tuberculosis movement it was clearly recognized that the man and woman in the home and in the factory are the only people who can prevent tuberculosis; and there resulted the organization of a campaign of popular education of unprecedented scope and effectiveness. The same thing has happened in the campaign against infant mortality. It began as a movement for pure milk, largely administrative in character. It soon appeared, however, that Budin's *consultations des nourissons*, not the *gouttes de lait*, indicated the line of profitable endeavor. One worker after another discovered that the success of a milk station was gauged, not by the number of quarts of milk distributed, but by the number of mothers taught to feed and care for their own children. In one city the authorities refuse to call them "milk stations" at all, but correct you and say "consultations"; and they are right, for the infant-mortality movement is an educational movement first and foremost. The campaign against venereal disease is following the same lines, and promises to become a third nation-wide organized effort for public enlightenment.

All this educational work puts new and unlooked-for stresses upon the Health Department of the olden times. It is a simple enough matter to purify the water-supply of a city. All that you have to do is to convince a Mayor and a Council or whatever the administrative authority may be, and the thing is done. But to get a sanitary sense into the heads of the people is much harder than to lead water-pipes into their houses. A really efficient State or city department of health must have an organization of experts in sanitary publicity such as was built up in Chicago during the administration as Health Commissioner of Dr. W. A. Evans. Instead of cumbrous annual reports he issued a weekly bulletin sparkling with cartoons and "healthgrams" that were quoted from one end of the country to the other.

He had a press service, which supplied the foreign papers, religious papers, and labor papers with weekly material, and a bulletin service, which placed constantly changing health hints on the notice boards of factories all over the city. Finally he had a staff of speakers, with himself at the head, ready to answer any call, and to give any group of men, women, or children news of the progress of the war against disease.

So far, no allusion has been made to the constitutional diseases, whose origin is largely internal, and which are commonly held to lie outside the field of public-health preventive work. Are these maladies, however, to be accepted as dispensations of Providence with no struggle for control on the part of the community as a whole? If so, the outlook is a grave one, for these "constitutional" diseases not only cause about half the total deaths to-day, but, while the "environmental" causes of death are increasing, some of the constitutional causes are steadily increasing, not relatively, but absolutely. The increase is in part of course due to the greater average age of the population. The environmental diseases are diseases of youth, and their reduction leaves more people to grow old and die of heart disease and kidney disease in later life. Even at a given age period, however, there is a real increase in the fatality of these diseases. Yet they are by no means beyond our control. In the first place, many "constitutional" diseases of the blood vessels or kidneys are due to "environmental" causes, to lead-poisoning, or alcoholism or venereal disease. In the second place, in almost every case death could be postponed by observance of proper hygienic rules. Often the physician is called in too late to do much good, and only by a systematic public-health movement of colossal proportions can a serious impression be made upon these diseases of later life. A few of the well-to-do and intelligent have themselves examined once a year after the age of forty, for the first signs of these maladies, which are some day sure to come. If public-health money may be spent, as it is spent, to detect tuberculosis in its curable stage, and to teach a man how to get well, why should not it be devoted in the same way to saving him from Bright's disease?

The history of school inspection is significant in this connection. It began as a public-health measure of the strict sanitary police type, that is, it was intended to protect one

child against another. To-day, however, nine-tenths of the work of school inspection is directed toward physical defects, such as bad teeth, poor vision, glands, and the like, which are not communicable at all. That is, the work has passed from the police stage of protecting one individual against another to the social stage of caring for the individual for his own sake. With adults we have not gone quite so far. The new English insurance act with its free medical attendance is, however, a step in the right direction, whatever fault may be found in detail with its terms. In the future it seems probable that a large proportion of the medical and nursing professions will be in the employ of the State, and that none of the preventable or mitigable maladies to which mankind is subject will lie beyond the scope of their preventive work.

This is for the future. In the present it is clear that there are public-health activities of the more usual and orthodox kind which are capable of yielding practical results of enormous importance, results which must not be sacrificed to the mistaken ideals of an outgrown pseudo-sanitation. The cleaning of streets, the improvement of sewage-polluted rivers and harbors, the inspection of plumbing, the supervision of food supplies to detect substitution and incipient decomposition, all these things are desirable from the standpoint of municipal cleanness and municipal decency. They are not primarily health measures, however. It cannot be shown that they save lives. They should be carried as far as a city or State can afford to carry them, but they must not take precedence of measures that are immediately needed to save human lives. When a city like Minneapolis spends \$76,000 for the collection and disposal of garbage and refuse and \$47,000 for its health department, it is clear that a sense of proportion is somewhere lacking. When one says that the death-rate of New York City has been reduced 40 per cent. in twenty years, the statistical statement is not impressive. If some powerful spirit like Lesage's Asmodeus could lift the roofs from the houses and show us over 200 deathbeds every day in this great city and then show us 130 other households where Azrael's sword would be flashing if sanitary science had not sheathed it, we should perhaps understand what the cold figures mean.